

CLAIMS

1. A fluoropolymer containing acid/acid salt groups and having $-\text{CF}_2\text{H}$ groups at polymer chain terminals,
5 wherein said acid/acid salt groups are sulfonic acid groups, $-\text{SO}_2\text{NR}^1\text{R}^2$, $-\text{SO}_3\text{NR}^3\text{R}^4\text{R}^5\text{R}^6$, $-\text{SO}_3\text{M}^1_{1/\text{L}}$, phosphoric acid groups, $-\text{PO}_3(\text{NR}^7\text{R}^8\text{R}^9\text{R}^{10})_2$ and/or $-\text{PO}_3\text{M}^2_{2/\text{L}}$, in the formula R^1 represents H or $\text{M}^6_{1/\text{L}}$, R^2 represents H, $\text{M}^7_{1/\text{L}}$, an alkyl group or a sulfonyl-containing group, R^3 , R^4 , R^5 , R^6 , R^7 , R^8 , R^9
10 and R^{10} are the same or different and each represents H or an alkyl group containing 1 to 4 carbon atoms, M^1 , M^2 , M^6 and M^7 are the same or different and each represents a metal having a valence of L, said metal having a valence of L being a metal belonging to the group 1, 2, 4, 8, 11, 12
15 or 13 of the long-form periodic table.

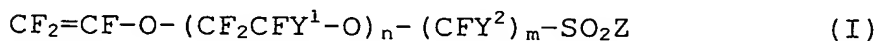
2. The fluoropolymer according to Claim 1,
said fluoropolymer being one obtained by subjecting a fluoropolymer precursor containing acid/acid salt groups
20 and having $-\text{CF}_2\text{COOX}$ groups at polymer chain terminals, in the formula X represents H, $\text{NR}^{11}\text{R}^{12}\text{R}^{13}\text{R}^{14}$ or $\text{M}^4_{1/\text{L}}$; R^{11} , R^{12} , R^{13} and R^{14} are the same or different and each represents H or an alkyl group containing 1 to 4 carbon atoms and M^4 represents a metal having a valence of L, said metal having
25 a valence of L being as defined above, to heat treatment by which said $-\text{CF}_2\text{COOX}$ groups can be converted to $-\text{CF}_2\text{H}$ groups, X being as defined above.

3. The fluoropolymer according to Claim 1 or 2,
30 wherein said acid/acid salt groups are sulfonic acid groups, $-\text{SO}_3\text{NR}^3\text{R}^4\text{R}^5\text{R}^6$ and/or $-\text{SO}_3\text{M}^1_{1/\text{L}}$, R^3 , R^4 , R^5 , R^6 and M^1 being as defined above.

4. The method of producing the fluoropolymer
35 according to any one of Claims 1 to 3, by subjecting a

fluoropolymer precursor containing acid/acid salt groups and having $-\text{CF}_2\text{COOX}$ groups at polymer chain terminals, in the formula X represents H, $\text{NR}^{11}\text{R}^{12}\text{R}^{13}\text{R}^{14}$ or $\text{M}^4_{1/L}$; R^{11} , R^{12} , R^{13} and R^{14} are the same or different and each represents H or an alkyl group containing 1 to 4 carbon atoms and M^4 represents a metal having a valence of L, said metal having a valence of L being a metal belonging to the group 1, 2, 4, 8, 11, 12 or 13 of the long-form periodic table, to heat treatment for the conversion of said $-\text{CF}_2\text{COOX}$ groups to $-\text{CF}_2\text{H}$ groups, X being as defined above,

wherein said fluoropolymer precursor is one obtained by polymerizing a perhalovinyl ether derivative represented by the general formula (I):



wherein Y^1 represents F, Cl or a perfluoroalkyl group, n represents an integer of 0 to 3, the n atoms/groups of Y^1 are the same or different, Y^2 represents F or Cl, m represents an integer of 1 to 5, the m atoms of Y^2 are the same or different and Z represents F, Cl, Br, I, $-\text{OM}^5_{1/L}$ or $-\text{ONR}^{15}\text{R}^{16}\text{R}^{17}\text{R}^{18}$; M^5 represents a metal having a valence of L and the metal having a valence of L is as defined above, and R^{15} , R^{16} , R^{17} and R^{18} are the same or different and each represents H or an alkyl group containing 1 to 4 carbon atoms,

when the group $-\text{SO}_2\text{Z}$ in the general formula (I) is not said acid/acid salt group but is a group convertible to such acid/acid salt group, said fluoropolymer precursor is one subjected to a conversion treatment, after the above-mentioned polymerization, for the conversion of said group $-\text{SO}_2\text{Z}$ to the above-mentioned acid/acid salt group, and said heat treatment comprises heating said fluoropolymer precursor at 120 to 400°C.

5. The method of producing a fluoropolymer according to Claim 4,

wherein the heat treatment comprises heating the fluoropolymer precursor at 120 to 200°C in the presence of water or an organic solvent having compatibility with water.

5 6. The method of producing a fluoropolymer according to Claim 5,

 wherein the organic solvent having compatibility with water is an organic liquid having a boiling point exceeding 100°C but not exceeding 300°C.

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 7. The method of producing a fluoropolymer according to any one of Claims 4 to 6,

 wherein the fluoropolymer precursor is an at least binary copolymer obtained by polymerizing the perhalovinyl ether derivative and a monomer copolymerizable with said
15 perhalovinyl ether derivative.

 8. The method of producing a fluoropolymer according to any one of Claims 4 to 7,

20 wherein Y^2 is F, n is 0 or 1 and m is 2 or 3.

 9. The method of producing a fluoropolymer according to any one of Claims 4 to 8,

 wherein the fluoropolymer precursor constitutes a
25 powder, dispersion, solution or membrane-shaped molding.

 10. The method of producing a fluoropolymer according to Claim 9,

 wherein the fluoropolymer precursor constitutes a
30 membrane-shaped molding.

 11. An electrolyte membrane comprising the fluoropolymer according to any one of Claims 1 to 3.

35 12. An immobilized active substance material

comprising the fluoropolymer according to any one of Claims 1 to 3 and an active substance.

13. The immobilized active substance material
5 according to Claim 12,
wherein the active substance is a catalyst.

14. The immobilized active substance material
according to Claim 13,
10 wherein the catalyst is a platinum-containing metal.

15. A membrane-electrode assembly comprising the
immobilized active substance material according to Claim 13
or 14.

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16. A solid polymer electrolyte fuel cell
comprising the membrane-electrode assembly according to
Claim 15.

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17. A solid polymer electrolyte fuel cell
comprising the electrolyte membrane according to Claim 11.